

REMARKS

Reexamination and reconsideration in light of the foregoing amendment to claim 1 and the following remarks is respectfully requested.

Claims 1-13 are pending in this application. Claims 4-13 have been withdrawn from consideration due to a restriction requirement. No new claims have been added.

Applicant notes the Examiner's acknowledgment of Applicant's claim for foreign priority under 35 U.S.C. § 119 and receipt of the certified priority document.

Claims 1-3 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because it is unclear where the "basic copper carbonate powder" is the same as the basic copper carbonate powder having impurities. The Examiner suggested adding the word "the" after "heating" in claim 1. The Examiner's suggestion has been adopted and the claim has been amended accordingly. In view of the amendment, the rejection is overcome and should be withdrawn.

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pasek et al. (U.S. Patent No. 5,492,681), Bartley (U.S. Patent No. 4,677,234), Okada et al. (U.S. Patent No. 6,218,335), Fernandez et al. (U.S. Patent No. 5,449,845) and Gottfried et al. (U.S. Patent No. 4,659,555). The Examiner also rejected claims 2 and 3 under 35 U.S.C. § 103(a) as being unpatentable over Pasek et al., Bartley, Fernandez et al. and Gottfried et al.

According to the Examiner, "Pasek teaches a method for manufacturing a copper electroplating material adapted to be fed as a copper ion supply to a copper plating bath in copper electroplating, comprising the step of: heating basic copper carbonate powder to a temperature to carry out thermal decomposition of the basic copper carbonate to thereby produce

easily dissolved copper oxide powder (= copper oxide has been produced commercially by the thermal decomposition of basic copper carbonate) [col. 1, lines 21-25; and col. 4, lines 55-67].” Pasek et al. discloses a method for producing copper oxide by forming and then heating a copper ammonium salt. In the background of the invention, Pasek et al. teach that copper oxide “has a range of commercial uses, including as a reactant in ... electroplating processes ...” and that it “has been produced commercially by ... electroplating ... [and] by the thermal decomposition of ... basic copper carbonate ...” (col. 1, lines 10-25). Pasek et al. do not teach or disclose a copper carbonate powder having impurities into a heating furnace and heating the basic copper carbonate powder to a temperature of 250°C to 800°C as required by claim 1.

The Examiner concedes that Pasek et al. fail to teach heating at a temperature of 250°C to 800°C in an atmosphere as required by the claim 1. For this deficiency, the Examiner relies on Bartley and states that “Bartley teaches that copper carbonate begins to decompose at a temperature of about 200°C” and that “[c]alcination in an air atmosphere converts the decomposable precursor to the oxide of the metal” and that “[i]n general, calcination is desirably carried out by exposure to temperatures ranging from about 200°C to about 500°C for a time sufficient to allow substantial conversion of copper carbonate to copper oxide (col. 7, lines 33-46).” The Examiner concludes that “the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Pasek with wherein the heating is at a temperature of 250°C to 800°C in an atmosphere which is not rendered reductive because copper carbonate begins to decompose at a temperature of about 200°C as taught by Bartley (col. 7, lines 38-39).” The Examiner has relied on the prior art disclosed in Pasek et al., and not on the Pasek et al. invention. The Examiner has not explained

how the Pasek et al. invention is modified. The combination of references merely supports the conclusion that exposing the basic copper carbonate to temperatures ranging from about 200°C to about 500°C under oxidizing conditions for a sufficient time would result in the conversion of the copper carbonate to copper oxide. Neither Pasek et al. nor Bartley taken alone or in combination, disclose heating basic copper carbonate containing impurities in an atmosphere which is not rendered reductive to carry out thermal decomposition of the basic copper carbonate to produce an easily dissolved copper oxide powder as required by claim 1.

The problem solved by Applicant is the reduction of impurities in the copper oxide powder. These impurities are deleterious to the electroplating bath. The teachings of Pasek et al. and Bartley are not directed to reducing impurities such as Cl and S ions found in copper oxide produced from copper carbonate. The teachings of Okada does not cure the deficiencies of the teachings of Pasek et al. and Bartley, taken alone or in combination.

The Examiner relies on Okada as teaching that “it is known to conduct calcination [of copper carbonate] in an electric furnace as taught by Okada (col. 3, lines 28-34). Okada et al. is directed to making a porous spinel type oxide. The reference does not disclose or suggest heating or even calcinating a basic copper carbonate, let alone a copper carbonate containing impurities as required by claim 1.

According to the Examiner, “[t]he impurities in the basic copper carbonate powder would have been depended upon how the basic copper carbonate powder was manufactured.” Also, the Examiner stated that “[a]s to washing the easily dissolved copper oxide powder with water for reducing the impurities which have been included in the basis [sic, basic] copper carbonate powder from the easily dissolved copper oxide powder to provide the copper electroplating

material, the impurities which have been included in the basic copper carbonate powder would have been depended upon how the basic copper carbonate powder was manufactured and reducing them from the easily dissolved copper oxide powder to provide the copper electroplating material would have depended upon the application of the easily dissolved copper oxide powder.” These findings are pure speculation. The Examiner has not provided an evidentiary support for this finding. *In re Thrift*, 298 F.3d 1357, 63 USPQ2d 2002, (Fed. Cir. 2002). The Examiner’s conclusion that “washing the easily dissolved copper oxide powder with water would have been well within the skill of the artisan to have done in order to have provided a clean copper electroplating material to be used as a reactant in an electroplating process (Pasek, col. 1, lines 10-17) because it is known in the electroplating art that impurities in the electroplating bath can affect the quality of the metal deposited (e.g., conductivity, adhesion, or brightness)” is not supported by any evidence. We agree with the Examiner that a “high purity copper oxide powder would have been desirable by one having ordinary skill in the art,” but the prior art relied upon by the Examiner does not teach or suggest how to obtain this high purity copper oxide powder. There is simply no teaching in the prior art relied upon by the Examiner that would not have led such a person skilled in the art to the claimed invention.

The Examiner relies on Fernandez et al. as teaching that washing a copper oxide precipitate with water removes soluble salts, including any excess alkali. Applicant concedes that the reference discloses the preparation of copper carbonate by mixing an aqueous solution of a copper sulfate and sodium carbonate and separating the reaction product by filtration (col. 78, lines 5 to 8). However, The reference does not teach washing after the heating step as required by claim 1. Therefore, Fernandez et al. do not disclose or suggest washing copper oxide formed

from the decomposition of copper carbonate to remove undesirable impurities. There is no teaching in the prior art relied on by the Examiner of making copper carbonate by mixing an aqueous solution of copper salt such as copper chloride, copper sulfate and copper nitrate with ammonia and decomposing the resultant product.

The Examiner relies on Gottfried as teaching “a process for preparing basic copper carbonate comprising the steps of: (a) mixing an aqueous solution of a copper salt selected from the group consisting of copper chloride, copper sulfate and copper nitrate (= a waste solution from copper etching processes of CuCl_2) and an aqueous solution of carbonate of a material selected from alkaline metal, alkaline earth metal and ammonia (NH_4) (= sodium carbonate solution) with each other; and (b) reacting both aqueous solutions with each other while heating them (= a temperature of 60°C), to thereby deposit a reaction product (= basic copper carbonate as a light green precipitated sludge), and separating the reaction product by filtration (filtered, washed and dried) [col. 2, line 56 to col. 3, line 6].” The Examiner concludes that “[i]t is deemed that the basic copper carbonate powder obtained by the process taught by Gottfried is a basic copper carbonate powder having impurities because similar processes can reasonably be expected to yield products which inherently have the same properties.” This again is pure speculation which has not been supported by any evidence. *In re Thrift, supra*.

Gottfried et al. teach away from the present invention. Gottfried et al. seek to produce a copper carbonate free of impurities (col. 1, lines 65 to col. 2, line 2). The Examiner has not explained how the copper complex, namely $\text{CuCO}_3 \bullet \text{Cu}(\text{OH})_2 \bullet x\text{H}_2\text{O}$ formed by Gottfried et al., would include impurities. Moreover, the reference does not teach removing impurities from copper oxide as required by claim 1. In addition, the reference does not disclose mixing a copper

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salt comprising copper sulfate or copper nitrate with an alkaline earth carbonate or ammonia. Accordingly, Gottfried et al. taken alone or in combination with Pasek et al., Bartley, Okada et al. and Fernandez et al. would not have led a person having ordinary skill in the art to the claimed invention.

The Examiner has not accorded patentable weight to the language in the preamble: "adapted to be fed as a copper ion supply to a copper plating bath in copper electroplating." The body of the claim is directed to making a copper oxide with reduced impurities and the body of the claim states that the copper oxide powder so formed is used to provide the copper plating material. The preamble does give life and meaning to the body of the claim and therefore should be accorded patentable weight. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 192 F.3d 1298, 51 USPQ2d 1161 (Fed. Cir. 1999).

CONCLUSION

For the foregoing reasons, it is submitted that the claims 1-3 are patentable over the teachings of the prior art relied upon by the Examiner. Accordingly, favorable reconsideration of the claims is requested in light of the preceding amendments and remarks. Allowance of the claims is courteously solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due under 35 U.S.C. § 1.17 and in connection

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with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



Cameron K. Weiffenbach
Registration No. 44,488

600 13th Street, N.W.
Washington, DC 20005-3096
Phone: 202.756.8000 CKW:ckw
Facsimile: 202.756.8087
Date: April 25, 2005

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